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ORIENTAL *RHINOLOPHUS*, WITH SPECIAL REFERENCE TO MATERIAL FROM THE ARCHBOLD COLLECTIONS

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The collection of *Rhinolophus* in the American Museum, though lacking very many species entirely, includes a sufficient number to make treatment of the Indo-Australian members as a whole desirable. Two new forms have been described beyond from the Archbold collections, namely: *R. pagi*, n. sp., *R. maros*, n. sp.

The geographical scope of the present paper excludes the *Rhinolophi* of Africa, Europe and temperate Asia. Thus the *midas* group will not be dealt with.

We are indebted to the curators of the museums at Genoa, Berlin, Leiden, London and Paris for permission to study and photograph the types of many species. The photographs of the skulls have been of the highest value in forwarding our studies.

In 1905 Andersen published in the order given an important series of studies on the several "groups" of *Rhinolophus*.[1] The list of species was followed by notes on geographical distribution. Further description of occasional new forms were climaxed with a paper in 1918,[2] read by Oldfield Thomas in Andersen's absence in which the "*megaphyllus*" (= *simplex*), "*pusillus*" (= *lepidus*), "*hipposideros*" (= *midas*), "*luctus*" (= *philippinensis*) and "*euryotis*" (= *arcuatus*) groups were partially keyed out.

Rhinolophus was erected by Lacépède in 1799. In it were included the species *ferrum-equinum*, designated type by Palmer, 1904, and *soricinus*. The type species was described by Schreber, 1775.

Arrangements of the species by authors prior to Andersen's work were those of Horsfield,[3] Temminck,[4] Gray,[5] Peters,[6] and Dobson.[7] Horsfield described only two species of *Rhinolophus*, *affinis* and *minor*. Temminck's oriental species arranged according to Andersen's list were:

affinis Horsfield, member of the *ferrum-equinum* group

minor Horsfield, *pusillus* and *cornutus*, members of the *pusillus* group

luctus and *trifoliatus*, members of the *philippinensis* group

euryotis, of the *euryotis* group.

When Horsfield and Temminck wrote, *Hipposideros* was considered merely a section of *Rhinolophus*. Gray proposed *Aquias* for *luctus* and *trifoliatus* and *Phyllotis* (homonym of *Phyllotis* Waterhouse, 1837) for *philippinensis*. *Aquias* and *Phyllotis* combined now constitute the "*philippinensis* group." *Rhinolophus* was restricted to contain the remainder of the groups.

Peters reduced *Aquias* and *Phyllotis*, to subgenera and proposed the subgeneric name *Coelophyllus*. His arrangement and diagnoses to some extent foreshadow those used by Andersen.

[1] *R. simplex* group, 1905, Proc. Zool. Soc. London, II, p. 75. *R. lepidus* group, 1905, Proc. Zool. Soc. London, II, p. 121. *R. midas* group, 1905, Proc. Zool. Soc. London, II, p. 138. *R. philippinensis* group, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 243. *R. arcuatus* group, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 281. *R. macrotis* group, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 289. A list of species and subspecies, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 648.

[2] Diagnoses of new bats, 1918, Ann. Mag. Nat. Hist., (9) II, p. 374.

[3] Horsfield, 1823, Zool. Researches Java.

[4] Temminck, 1835, Monogr. Mamm., 8th monograph.

[5] Gray, 1866, Proc. Zool. Soc. London, p. 81.

[6] Peters, 1871, Monatsber. Akad. Berlin, p. 303.

[7] Dobson, 1875, Ann. Mag. Nat. Hist., (4) XVI, p. 346; 1876, Monograph Asiatic Chiroptera, p. 36; 1878, Catalogue Chiroptera British Museum, p. 100.

Dobson (1876) separated *Rhinolophus* as a distinct subfamily on the basis of the retention of the extra joint in the toes. His classification of the species differed only slightly from that of Peters. His larger work (1878) was substantially repetition. In 1907 Miller further separated *Rhinolophus* from *Hipposideros* and its allies by giving Dobson's subfamily family rank. Recently (1934) Iredale and Troughton have set off *Rhinophyllotis*, with type *Rhinolophus megaphyllus*.[1]

The following list represents Andersen's synoptic arrangement (1905, p. 648) brought up to date, with his "sub-groups" and later described species and races intercalated in their proper places. The asterisk signifies that the species is present in the American Museum collections; the cross, that we possess a photograph of the type skull. For the purpose of easy comparison Andersen's arrangement of the groups and subgroups is preserved.

The *ferrum-equinum* group[2] (= The *simplex* group, 1905 = the *megaphyllus* group, 1918).

	Type locality
The *simplex* subgroup:[3]	
+ *simplex* Andersen	Lombok, Lesser Sunda Islands
+ *megaphyllus* Gray	E. Australia
megaphyllus ignifer G. M. Allen	Coen dist., N. Queensland
+ *megaphyllus monachus* Andersen	Louisiades, E. New Guinea
fallax Andersen	Kemp Welch R., Papua
+ *keyensis* Peters	Kei Islands
+ *truncatus* Peters	Batjan
+ *nanus* Andersen	Goram
The *borneensis* subgroup:	
+ **celebensis* Andersen	Macassar, Celebes
**borneensis* Peters	Sarawak, N. Borneo
borneensis spadix Miller	Natuna Islands
+ *javanicus* Andersen	S. Java
virgo Andersen	Luzon, Philippines
+ *madurensis* Andersen	Madura Island, Java
+ **malayanus* Bonhote	Jalor
Offshoots of the *borneensis* subgroup:	
nereis Andersen	Anambas Islands
+ *stheno* Andersen	Selangor, Malay Peninsula
anderseni Cabrera	Philippines
anderseni aequalis G. M. Allen	Palawan Island
The *rouxi* subgroup:	
rouxi Temminck	Darjiling, India
petersi Dobson	India
+ **rouxi sinicus* Andersen	Yangtsi
+ *thomasi* Andersen	Karin Hills, Burma
The *affinis* subgroup:	
+ *affinis* Horsfield	Java
**affinis himalayanus* Andersen	Masuri, India
+ **affinis tener* Andersen	Pegu, mouth of Irawadi R.
+ **affinis macrurus* Andersen	Karin Hills, Burma
+ *affinis superans* Andersen	Lower Siam
**affinis hainanus* J. A. Allen	Hainan, S. China
+ *affinis princeps* Andersen	Lombok
andamanensis Dobson	S. Andamans
+ *robinsoni* Andersen	Lower Siam
+ *klossi* Andersen	Pemangil
The *ferrum-equinum* subgroup:	
ferrum-equinum and races	

[1] After completion of this manuscript the first volume of "The Mammals of China and Mongolia," by G. M. Allen, 1938, appeared (*Rhinolophus*, pp. 163–188). In it Allen transferred *H. rex* from the *macrotis* to the *philippinensis* group.

[2] Changed to permit the name of the genotype to head the group.

[3] Iredale and Troughton, 1934, erected *Rhinophyllotis* with type *Rhinolophus megaphyllus*, without description.

The *lepidus* group, 1905 (= the *pusillus* group, 1918).

	Type locality
The *lepidus* subgroup:	
lepidus Blyth	Ganges Valley
+ *lepidus shortridgei* Andersen	Irawadi R.
+ *monticola* Andersen	Masuri
+ *refulgens* Andersen	Perak
+ *refulgens cuneatus* Andersen	Deli, Sumatra
+ *cognatus* Andersen	South Andamans
+ *famulus* Andersen	Central Andamans
+ *feae* Andersen	Karin Hills, Burma
**acuminatus* Peters	Java
+ *acuminatus audax* Andersen	Lombok
+ *sumatranus* Andersen	Sumatra
- *circe* Andersen	Nias
**calypso* Andersen	Engano Island
The *minor* subgroup:	
+ *pusillus* Temminck	Java
+ *minor* Horsfield	Java
minutillus Miller (new name for *minutus*)	Anambas Islands
cornutus Temminck	Japan
+ *cornutus pumilus* Andersen	Riu Kiu Islands
cornutus orii Kuroda	Riu Kiu Islands
cornutus miyakonis Kuroda	?
+ *perditus* Andersen	Riu Kiu Islands
gracilis Andersen	Malabar Coast
**blythi* Andersen	Kumaon, 5500 feet, India
**blythi calidus* G. M. Allen	Fukien
**blythi parcus* G. M. Allen	Hainan
+ **blythi szechwanus* Andersen	Szechwan
The *subbadius* subgroup:	
garoensis Dobson	Masuri
subbadius Blyth	Nepal
+ *monoceros* Andersen	Formosa

The *philippinensis* group, 1905 (= the *luctus* group, 1918).

The *philippinensis* subgroup:	
+ *philippinensis* Waterhouse	Philippines
+ *achilles* Thomas	Kei Island
mitratus Blyth	N. India
The *sedulus* subgroup:	
+ *sedulus* Andersen	N. Borneo
+ *edax* Andersen	Singapore
**lanosus* Andersen	N. W. Fukien
**lanosus spurcus* G. M. Allen	Hainan, S. China
The *trifoliatus* subgroup	
+ *trifoliatus* Temminck	Bantam, Java
trifoliatus niasensis Andersen	Nias Island
+ **morio* Gray	S. W. Borneo
+ *foetidus* Andersen	Baram, Sarawak
+ *beddomei* Andersen	S. India
beddomei sobrinus Andersen	Ceylon
+ *luctus* Temminck	Tapos, Java
+ *geminus* Andersen	Java
+ *perniger* Hodgson	Sikkim
The *macrotis* group	
+ *macrotis* Hodgson	Masuri
+ *macrotis dohrni* Andersen	N. W. Sumatra
macrotis siamensis Gyldenstolpe	Siam
**episcopus* G. M. Allen	Szechwan
**episcopus caldwelli* G. M. Allen	Fukien
+ *pearsoni* Horsfield	Masuri
+ *pearsoni chinensis* Andersen	Fukien
**rex* G. M. Allen	Szechwan

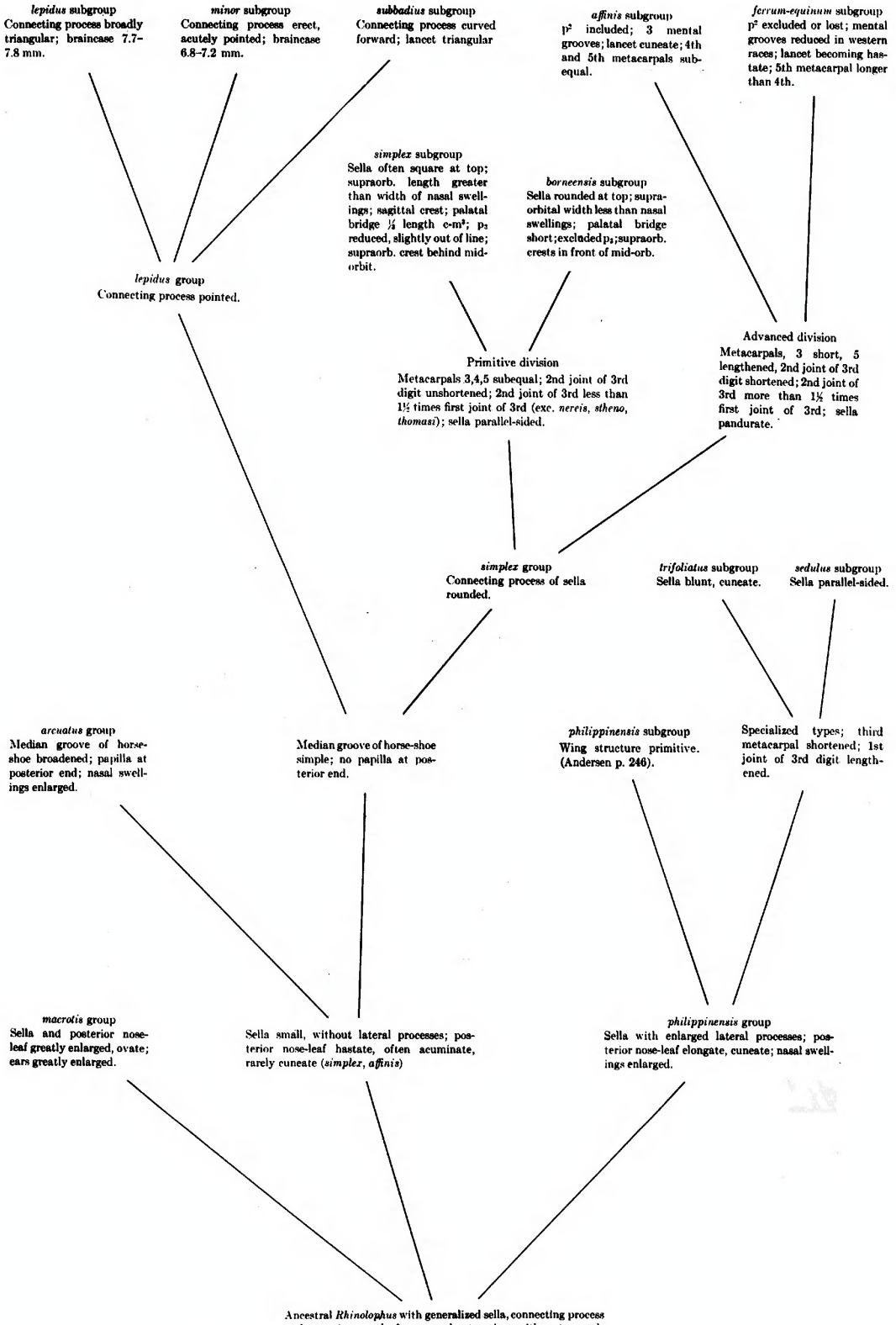
The *arcuatus* group, 1905 (= the *euryotis* group, 1918).

	Type locality
The *arcuatus* subgroup:	
arcuatus Peters	Luzon
+ *arcuatus exiguus* Andersen	Zamboangas, Philippines
+ *arcuatus beccarii* Andersen	Sumatra
+ *toxopei* Hinton	Buru
+ *subrufus* Andersen	Philippines
bunkeri Taylor	Mindanao
inops Andersen	Mindanao
+ *creaghi* Thomas	N. Borneo
+ *canuti* Thomas	S. Java
+ *pilosus* Andersen	Madura, Java
coelophyllus Peters	Malay
The *euryotis* subgroup:	
+ *euryotis* Temminck	Amboina
+ *euryotis praestans* Andersen	Kei Island
+ *euryotis aruensis* Andersen	Aru
+ *euryotis timidus* Andersen	Batjan
+ *euryotis burius* Hinton	Buru

Andersen's chief criteria for his system of classification were length of palate; degree of reduction and displacement of p^2 and p_3; development of rostral swellings; position and height of supraorbital and sagittal crests; degree of narrowing of basioccipital by encroachment of audital bullae; proportions of the nasal appendages:—the horse-shoe, sella, connecting process and posterior nose-leaf; size and form of ears and antitragus; proportions of wing members; of feet; of tail; development of mental grooves.

He regarded the following characters as primitive: unshortened palate; retention of p^2 and p_3 in line with toothrows; subequal metacarpals (the 4th a trifle longer); three mental grooves.

Whether Andersen's groups of oriental *Rhinolophi* are truly phylogenetic will not be discussed in the present paper. His association of the *lepidus* and *simplex* groups seems justified, as the principal distinction between them appears to be the form of the connecting process of the nasal foliations; but his alliance of the *philippinensis* and *macrotis* groups seems unwarranted. The *arcuatus* group (at least the *euryotis* subgroup) appears to be an offshoot from the unspecialized root of the *simplex-lepidus complex*. An arrangement is shown below which may represent the phylogeny of the groups and subgroups now being studied.


lepidus subgroup
Connecting process broadly triangular; braincase 7.7–7.8 mm.
minor subgroup
Connecting process erect, acutely pointed; braincase 6.8–7.2 mm.
subbadius subgroup
Connecting process curved forward; lancet triangular
affinis subgroup
p^2 included; 3 mental grooves; lancet cuneate; 4th and 5th metacarpals subequal.
ferrum-equinum subgroup
p^2 excluded or lost; mental grooves reduced in western races; lancet becoming hastate; 5th metacarpal longer than 4th.
simplex subgroup
Sella often square at top; supraorb. length greater than width of nasal swellings; sagittal crest; palatal bridge ¼ length $c\text{-}m^3$; p_3 reduced, slightly out of line; supraorb. crest behind mid-orbit.
borneensis subgroup
Sella rounded at top; supra-orbital width less than nasal swellings; palatal bridge short; excluded p_3; supraorb. crests in front of mid-orb.
lepidus group
Connecting process pointed.
Primitive division
Metacarpals 3,4,5 subequal; 2nd joint of 3rd digit unshortened; 2nd joint of 3rd less than 1½ times first joint of 3rd (exc. *nereis, stheno, thomasi*); sella parallel-sided.
Advanced division
Metacarpals, 3 short, 5 lengthened, 2nd joint of 3rd digit shortened; 2nd joint of 3rd more than 1½ times first joint of 3rd; sella pandurate.
simplex group
Connecting process of sella rounded.
trifoliatus subgroup
Sella blunt, cuneate.
sedulus subgroup
Sella parallel-sided.
arcuatus group
Median groove of horse-shoe broadened; papilla at posterior end; nasal swellings enlarged.
Median groove of horse-shoe simple; no papilla at posterior end.
philippinensis subgroup
Wing structure primitive. (Andersen p. 246).
Specialized types; third metacarpal shortened; 1st joint of 3rd digit lengthened.
macrotis group
Sella and posterior nose-leaf greatly enlarged, ovate; ears greatly enlarged.
Sella small, without lateral processes; posterior nose-leaf hastate, often acuminate, rarely cuneate (*simplex, affinis*)
philippinensis group
Sella with enlarged lateral processes; posterior nose-leaf elongate, cuneate; nasal swellings enlarged.
Ancestral *Rhinolophus* with generalized sella, connecting process and posterior nose-leaf; ears moderate; wings with metacarpals subequal; skull with rostral swellings; palate not yet greatly shortened; p^2 and p_2 present and included in toothrows.

The diagram is built up chiefly from statements in Andersen's papers. It has been checked as fully as our material will allow.

Apart from the shape of the connecting process, the larger members of the *lepidus* subgroup are very similar in appearance to some of the *borneensis rouxi* bats. Also there is superficial similarity between the *euryotis* and *affinis* bats. The American Museum possesses no representations of the *simplex*, *philippinensis* and *arcuatus* subgroups.

The succeeding comments serve to record the bats in our collections and to describe new forms in their systematic places.

Rhinolophus celebensis Andersen

Rhinolophus celebensis ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 83.

TYPE LOCALITY.—Macassar, S.W. Celebes.

MATERIAL.—Series of 10 specimens from S. and S. E. Celebes; 5 from Roeroekan, N. E. Celebes; 1 individual (red phase) also from Roeroekan.

Rhinolophus borneensis Peters

Rhinolophus borneensis PETERS, 1861, Monatsber. Akad. Berlin, p. 709.

TYPE LOCALITY.—Banguey, Sarawak.

MATERIAL.—One specimen from Peleben, N. E. Borneo.

Rhinolophus malayanus Bonhote

Rhinolophus malayanus BONHOTE, 1903, Fasciculi Malayenses, Zool. I, p. 15.—ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 89.

TYPE LOCALITY.—Biserat, Jalor.

MATERIAL.—Three specimens from Laos, Indo-China. These bats seem to be representative of the specimen with damaged skull from Laos referred to by Andersen. P^2 is included in toothrow; p_3 excluded. The species seems to be closely related to *rouxi* and *thomasi*.

Measurements of Laos specimens in table.

Rhinolophus rouxi sinicus Andersen

Rhinolophus rouxi sinicus ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 98.

TYPE LOCALITY.—Chin Tah, Anhwei, Yangtse, China.

MATERIAL.—Series identified by G. M. Allen from Yenping and Chungan Hsien, Fukien, and from Wanhsien, Szechwan, China.

Rhinolophus affinis affinis Horsfield

Rhinolophus affinis HORSFIELD, 1824, Researches in Java, Pl. VII, figs. A, B, and four-line description in latin. The plate is marked as published October 1823.

Rhinolophus affinis TEMMINCK, 1835–1841, Monogr. Mamm., II, p. 31.

Rhinolophus affinis typicus ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 104.

TYPE LOCALITY.—Java.

MATERIAL.—Three males from North Pagi, Mentawi Islands. On account of the close agreement with the description and our photograph of Horsfield's type and of remoteness of the type localities of other races of *affinis* the Pagi specimens are referred to typical *affinis*. The dorsal color of the males was described by Temminck as "brun couleur de suie," the females as "brun roussâtre." Our males (we have no females) show no trace of reddish, their dorsal color being near Mummy Brown.[1] The rhinal and cranial characters are also strictly those of *affinis* as described by Andersen.

Measurements of Pagi specimens and of the type skull of *affinis:* see table.

Rhinolophus affinis himalayanus Andersen

Rhinolophus affinis himalayanus ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 103.

TYPE LOCALITY.—Masuri.

MATERIAL.—Few individuals identified by G. M. Allen from Wanhsien, Szechwan, China.

Rhinolophus affinis tener Andersen

Rhinolophus affinis tener ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 103.

TYPE LOCALITY.—Pegu, Lower Burma.

MATERIAL.—Two, identified with doubt by G. M. Allen, from Li Chiang, China, between 8000 and 9000 feet.

[1] Names of colors in capitals in this paper refer to Ridgway, "Color Standards and Nomenclature."

Rhinolophus affinis macrurus Andersen

Rhinolophus affinis macrurus ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 103.

TYPE LOCALITY.—Taho, Karennee, Burma.

MATERIAL.—Small series identified by G. M. Allen, from various places in the province of Fukien, China.

Rhinolophus affinis hainanus J. A. Allen

Rhinolophus hainanus J. A. ALLEN, 1906, Bull. Amer. Mus. Nat. Hist., XXII, p. 482.

TYPE LOCALITY.—Pouten, Hainan Island, S. China.

MATERIAL.—The original series (with type) examined by Allen; a second series from Nodoa, Hainan.

The describer compared *hainanus* with *mitratus* Blyth, a member of the *philippinensis* group. The series from Fukien which Allen identified as *nippon* may be referable instead to this species.

Rhinolophus acuminatus Peters

Rhinolophus acuminatus PETERS, 1871, Monatsber. Akad. Berlin, p. 308.

TYPE LOCALITY.—Gadok, Java.

MATERIAL.—Six specimens from Kalianda, S. Sumatra, 100 m. The forearm length published by Peters was 48 mm., not "50.5–51" (Andersen, 1905, p. 134). Therefore there may be less racial difference between *acuminatus* and *audax* than Andersen supposed.

Measurements of our series in table.

Rhinolophus calypso Andersen

Rhinolophus calypso ANDERSEN, 1905, Proc. Zool. Soc. London, II, p. 134.

TYPE LOCALITY.—Kifa Juc, Engano Island.

MATERIAL.—Four paratypes in alcohol with skulls still inside.

Rhinolophus blythi blythi Andersen

Rhinolophus blythi ANDERSEN, 1918, Ann. Mag. Nat. Hist., (9) II, p. 376.

TYPE LOCALITY.—Almora, Kumaon, India, 5500 feet.

MATERIAL.—Single specimen, nearly a topotype from East Kumaon, United Provinces, 6000 feet.

This individual, formerly identified as *lepidus*, is not only topotypical of *blythi* but agrees well with the abbreviated description published for Andersen.

Rhinolophus blythi calidus G. M. Allen

Rhinolophus blythi calidus G. M. ALLEN, 1928, Amer. Mus. Novitates, No. 85, p. 1.

TYPE LOCALITY.—Yenping, Fukien Province, China.

MATERIAL.—The series studied by Allen, with type specimen.

Rhinolophus blythi parcus G. M. Allen

Rhinolophus blythi parcus G. M. ALLEN, 1928, Amer. Mus. Novitates, No. 317, p. 2.

TYPE LOCALITY.—Nodoa, Hainan Island, S. China.

MATERIAL.—The series (with type) studied by Allen.

Rhinolophus blythi szechwanus Andersen

Rhinolophus blythi szechwanus ANDERSEN, 1918, Ann. Mag. Nat. Hist., (9) II, p. 376.

TYPE LOCALITY.—Chung King, Szechwan, China.

MATERIAL.—Series from Szechwan identified by G. M. Allen.

Rhinolophus pagi, new species

TYPE.—No. 103333, Amer. Mus. Nat. Hist.; adult ♂; North Pagi, Mentawi Islands; coll. J. J. Menden, January 19, 1935.

GENERAL CHARACTERS.—A wood-brown colored member of the *lepidus* group, with hair bases scarcely paler than tips; skull with unnarrowed braincase; connecting process pointed in the type (to curved forward in some paratypes); apparently linking *refulgens* and *cuneatus* to *garoensis* and *famulus*.

DESCRIPTION OF TYPE.—Color above Mummy Brown, the bases slightly paler; below near Drab. Ears, wing and tail fuscous. Third, fourth and fifth metacarpals subequal (26 mm.) and 72 per cent of forearm (a normal ratio); 1st phalanx of D3 10 mm., or 39 per cent of third metacarpal; acute-angled notch between pinna and antitragus of ear; sella somewhat narrowly "rounded off," parallel-sided; transverse process high, pointed (see beyond), commencing well below top of sella; posterior nasal process broadly triangular but its sides terminally slightly emarginate to form a blunt-acuminate tip.

Skull with braincase un-narrowed

$$\frac{\text{braincase}}{\text{occipito-canine length}} = \frac{7.1}{16.3} = 44 \text{ per cent;}$$

(in *blythi*, 39 per cent); rostral swelling moderate, 63 per cent of width of braincase; palatal bridge short, 30 per cent of c-m^3; p^2 included in toothrow; p_3 slightly excluded (in type).

MEASUREMENTS.—See table.

Besides the type we have before us five paratypes whose proportions (see table) fluctuate very little from those of the type specimen. All were taken within a few days of one another at the same locality. In three of them p_3 is excluded and in the fourth it is absent from the lower toothrow. Andersen calls this feature "vacillating."

Rhinolophus pagi seems to bridge over the hard and fast division made by Andersen for the *subbadius* and *minor* subgroups. In two of our paratypes the connecting process has its pointed prominence distinctly bent forwards in side view, in the remainder it is erect and pointed.

Notes on the *philippinensis* group

The "*philippinensis* group" of Andersen, though evidently isolated from the rest of *Rhinolophus*, is difficult to classify satisfactorily. Andersen's three subgroups, particularly the *philippinensis* and *trifoliatus* subgroups are separated with difficulty. Moreover, Thomas's description of *achilles* from Kei Islands recalls the large-eared *macrotis* group.

The group originated in Temminck's two species *luctus* and *trifoliatus*. The former, from Tapos, Java, was large, with woolly, smoky brown hair, and forearm 63 mm. The latter, from Bantam, Java, was smaller, with long, drab-colored hair and forearm 50 mm. Subsequently described bats related more or less to *luctus* were *geminus*, *perniger*, *morio*, *foetidus*, *beddomei*, *sobrinus*, *lanosus* and *spurcus*. To *trifoliatus* can be related *edax*, *sedulus*, *mitratus*, *solitarius* and (?) *philippinensis*.

The relationship of the first phalanx of third digit to forearm is 40 per cent in *luctus;* in *trifoliatus* it is 38 per cent. Both percentages are subject to correction, being based upon the careful drawings published by Temminck. In the same illustrations the ratio of the second (terminal) joint of digit 3 to the first is 145 per cent in *luctus*, while in *trifoliatus* it is 140 per cent—a difference of insignificant proportions. Andersen's remarks (1905, pp. 251–252) were based on bats from Selangor and Borneo.

While it is felt that the "*philippinensis* group" is in need of careful revision, lack of material prevents any effort in that direction at present.

Rhinolophus lanosus lanosus Andersen

Rhinolophus lanosus ANDERSEN, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 248.

TYPE LOCALITY.—Kuatun, N. W. Fukien, China.

MATERIAL.—One specimen, A.M.N.H. 44764, from Fukien (identified by G. M. Allen). In addition, the Museum possesses one specimen of *lanosus* from Laos, Indo-China and a second belonging to the group which comes from northern Burma. The Fukien and Burma specimens have forearms 68.5 and 68.0 mm., respectively, the Laos specimen, 72 mm. The forearm of the type of *lanosus spurcus* was 67 mm.

MEASUREMENTS.—See table.

Rhinolophus lanosus spurcus G. M. Allen

Rhinolophus lanosus spurcus G. M. ALLEN, 1928, Amer. Mus. Novitates, No. 317, p. 3.

TYPE LOCALITY.—Nodoa, Hainan Island, S. China.

MATERIAL.—The type only.

MEASUREMENTS.—See table.

Rhinolophus sedulus Andersen

Rhinolophus sedulus ANDERSEN, 1905, Ann. Mag. Nat. Hist., (7) XVI, p. 247.

TYPE LOCALITY.—Baram, E. Sarawak.

MATERIAL.—Two from Riam, S. W. Borneo; two from Sampit, S. Borneo; two from Perboewa, N. W. Borneo.

The forearms of the Sampit specimen are only 48–49 mm. against 51–52 mm. in the remainder. They appear all to be closely related to *trifoliatus* Temminck from Java.

Rhinolophus rex G. M. Allen

Rhinolophus rex G. M. ALLEN, 1923, Amer. Mus. Novitates, No. 85, p. 3.

TYPE LOCALITY.—Wahnsien, Szechwan, China.

MATERIAL.—The original small series with type.

Rhinolophus maros, new species

TYPE.—No. 102347, Amer. Mus. Nat. Hist.; adult ♀; Talassa, Maros, South Celebes, 300 meters; collector, G. Heinrich, November 9, 1931.

GENERAL DESCRIPTION.—A member of the *R. macrotis* group. Though lacking the pilation of the sella, and with palatal bridges moderately shortened, the enlarged ear, antitragus, and sella, combined with the proportionately small posterior nose-leaf link the species with the above mentioned group. The only forms approaching the present one geographically are the much smaller *hirsutus* from the Philippines, forearm 44.7 mm.; and *macrotis dohrni* from N. W. Sumatra, forearm 44.0 mm. In *maros* the forearm is 53 mm.

DESCRIPTION OF TYPE.—Dorsal color Bister to Warm Sepia, the individual hairs with pale reflections, the bases of the ears in mastoid area Wood Brown to light Drab; underparts near Hair Brown.

Ears with the proportionally great size of the group; the antitragus a greatly enlarged lobe; strongly developed hair growth along the proximal half of the anterior margin of the pinna inside; horsehoe moderately broad (120 per cent of width of braincase; in *rex*, 135 per cent), sella though enlarged (width of sella 55 per cent of width braincase; in *rex*, 75 per cent), much broader proportionally than the sellae of other groups of *Rhinolophus;* lobes of base of sella enlarged, though less so than in *rex;* posterior nose-leaf much reduced—narrower at base than broadest part of nose-leaf; connecting process small, rounded off, without special structures; third and fifth metacarpals equal (36 mm.), 68 per cent of forearm; fourth metacarpal 39 mm.; first phalanx of third digit 16.5 mm., or 46 per cent of third metacarpal; tibia moderate (23 mm.); tail long (29 mm., or 125 per cent of tibia).

Skull with the squamosal area markedly cellular (as in *rex*); braincase rather low; $\frac{\text{width of braincase}}{\text{occipito-canine length}} = \frac{9}{22} = 40$ per cent; rostral swellings 70 per cent of braincase, a single rounded structure with fairly pronounced frontal depression behind it. Length of palatal bridge as high as 63 per cent of c-m^3 (compare *rex*, 41 per cent); p^2 included in toothrow; p_3 also included.

MEASUREMENTS.—See table.

Four paratypes accompany the type. All show the dental condition just described.

The new species appears to be related to *rex*, though less advanced along the lines of specialization shown in that species.

Rhinolophus episcopus episcopus G. M. Allen

Rhinolophus episcopus episcopus G. M. ALLEN, 1923, Amer. Mus. Novitates, No. 85, p. 2.

TYPE LOCALITY.—Wahnsien, Szechwan, China.

MATERIAL.—Considerable series, with type.

Rhinolophus episcopus caldwelli G. M. Allen

Rhinolophus episcopus caldwelli G. M. ALLEN, 1923, Amer. Mus. Novitates, No. 85, p. 3.

TYPE LOCALITY.—Yuki, Fukien, China.

MATERIAL.—The type only.

Rhinolophus euryotis Temminck

Rhinolophus euryotis TEMMINCK, 1835, Monogr. Mamm., II, p. 26, Pl. XXIX, fig. 5, Pl. XXXII, figs. 13–15.

Andersen's discussion (1905, pp. 282, 285–288) of *euryotis* is somewhat invalidated from the fact that he assumed the length of the forearm in "*euryotis typicus*" to be 56 mm., whereas Temminck writes "antibrachium 2 pouces"–50.8 mm., basing his description on 3 females and 2 males from Amboina.

Our own *euryotis* fall into two main groups: specimens from western New Guinea in which the forearm varies from 54 to 56 mm., and material from several localities in south and southeast Celebes with forearms from 48 to 51 mm. Beside the character of the forearm there appear supplementary differences in the skull.

The races of *euryotis* which have been described already, when compared are seen to be divisible in somewhat the same way; *praestans* from Kei, *timidus* from Batjan, *burius* from Buru have forearms between 55 and 58 mm.; *aruensis* from Aru has 53.6, and *euryotis* of Temminck (not of Andersen) has 50.8 mm. If, as seems probable, *euryotis euryotis* is applicable to the short-winged forms our material from Celebes must be so identified. Our New Guinea material is probably referable to *timidus*, though in it the braincase is slightly narrower.

MEASUREMENTS.—The dimensions of the types of described races as well as of our material appear in the table.

	R. malayanus A.M.N.H. 87300 ♀ Laos	*R. malayanus* A.M.N.H. 87301 ♂ Laos	*R. malayanus* A.M.N.H. 87302 ♂ Laos	*R. malayanus* (type) B.M. 3.2.6.83	*R. a. affinis* A.M.N.H. 103240 ♂ Pagi Island	*R. a. affinis* A.M.N.H. 103241 ♂ Pagi Island	*R. a. affinis* A.M.N.H. 103242 ♂ Pagi Island	*R. a. affinis* (type) B.M. 79.11.21.70
Skin:								
forearm	45.0	42.0	42.0		48.0	46.5	47.0	
Skull:								
zygomatic breadth								
breadth braincase	8.0	7.9	8.0	7.8	9.5	9.5	9.4	
mastoid breadth								
width rostral swelling	5.3	5.4	5.1	5.3	6.1	6.2	6.0	5.5
length palatal arch	2.1	2.2	2.2		2.2	2.4	2.2	2.2
breadth meso.-pter. fossa	2.7	2.7	2.5		3.5	3.4	3.3	3.4
width across m^3-m^3	7.6	7.4	7.2	7.0	8.5	8.6	8.4	8.4
Teeth:								
crowns c-m^3	7.1	7.3	7.0	7.1	8.7	9.0	8.8	9.0
crowns m^{1-3}	4.7	4.5	4.5	4.6	5.0	5.2	5.2	5.2

	R. f. nippon A.M.N.H. 84865 ♂ Fukien	*R. f. nippon* A.M.N.H. 84862 ♂ Fukien	*R. acuminatus* A.M.N.H. 102986 ♂ S. Sumatra	*R. acuminatus* A.M.N.H. 102987 ♂ S. Sumatra	*R. acuminatus* A.M.N.H. 102988 ♂ S. Sumatra	*R. acuminatus* A.M.N.H. 102989 ♂ S. Sumatra	*R. acuminatus* A.M.N.H. 102990 ♂ S. Sumatra	*R. acuminatus* A.M.N.H. 102991 ♂ S. Sumatra
Skin:								
forearm		54.0	47.0	46.5	46.5	46.5	47.5	47.0
Skull:								
zygomatic breadth	12.1	12.1						
breadth braincase	10.0	10.1	8.4	8.7	8.4	8.5		8.8
mastoid breadth	11.0	11.1						
width rostral swelling	6.5	6.6	5.8	6.1	6.0	6.0	6.0	6.0
length palatal arch	3.0	3.0	2.3	2.0	2.3	2.5	2.5	2.5
breadth meso.-pter. fossa	2.9	3.0	2.7	2.8	2.7	2.6	2.8	2.5
width across m^3-m^3	9.0	9.1	8.0	8.4	8.3	8.1	8.3	7.6
Teeth:								
crowns c-m^3	9.5	9.5	8.4	8.9	8.8	8.5	8.5	8.5
crowns m^{1-3}	5.6	5.5	5.0	5.2	5.2	5.1	5.1	5.0

	Rhinolophus pagi A.M.N.H. 103234 ♀ N. Pagi	*Rhinolophus pagi* A.M.N.H. 103232 ♀ N. Pagi	*Rhinolophus pagi* A.M.N.H. 103332 ♀ N. Pagi	*Rhinolophus pagi* (type) A.M.N.H. 103333 ♂ N. Pagi	*Rhinolophus pagi* A.M.N.H. 103233 ♀ N. Pagi	*R. lanosus spurcus* (type) A.M.N.H. 58444 ♂ Nodoa, Hainan	*R. lanosus lanosus* A.M.N.H. 44764 ♀ Fukien	*R. lanosus lanosus* A.M.N.H. 87311 ♂ Laos, Indo-China	*R. lanosus lanosus* A.M.N.H. 112909 ♂ Northern Burma
Skin:									
forearm	35.3	36.0	38.0	36.2	37.6	67.0	68.5	72.0	68.0
Skull:									
zygomatic breadth									
breadth braincase	7.0	7.0	7.2	7.1		12	11.4	11.9	
mastoid breadth									
width rostral swelling	4.4	4.3	4.3	4.5	4.5	8.1	8.4	8.3	
length palatal arch	1.4	1.5	1.5	1.8	1.5	5.0	4.3	4.1	
breadth meso.-pter. fossa	2.4	2.0		2.2		3.6	4.1	4.1	
width across m^3-m^3	6.1	5.9		6.0		10.5	10.6	10.5	
Teeth:									
crowns c-m^3	5.8	5.7	5.7	6.0	5.8	11.6	11.4	12.1	
crowns m^{1-3}	3.5	3.5	3.5	3.5	3.6	6.7	6.7	7.1	

	Rhinolophus maros (type) A.M.N.H. 102347 ♀ Maros, S. Celebes	*Rhinolophus maros* A.M.N.H. 102349 ♀ Maros, S. Celebes	*Rhinolophus maros* A.M.N.H. 102351 ♂ Maros, S. Celebes	*Rhinolophus maros* A.M.N.H. 102350 ♂ Maros, S. Celebes	*Rhinolophus maros* A.M.N.H. 102348 ♂ Maros, S. Celebes	*Rhinolophus eurygotis* (type) Amboina	*Rhinolophus praestans* (type) Kei	*Rhinolophus aruensis* (type) Aru	*Rhinolophus timidus* (type) Batjan	*Rhinolophus burius* (type) Buru
Skin:										
forearm	53.0	52.0	54.0	53.0	52.0	50.8	58.0	53.6	55–57	56.0
Skull:										
zygomatic breadth										
breadth braincase	9.0	8.3	8.8		9.2		11.1	10.2	10.4	
mastoid breadth										
width rostral swelling	6.3	6.0	6.2	6.4	6.6		7.2	6.7	6.8–6.9	6.6
length palatal arch	3.3	3.0	3.3	3.2	3.4					
breadth meso.-pter. fossa	2.9	2.9	2.9	2.9	3.0					
width across m^3-m^3	7.3	7.0	7.1	7.1	7.1					
Teeth:										
crowns c-m^3	8.1	7.7	8.3	8.0	8.1		10.2	9.5	9.7	9.6
crowns m^{1-3}	4.9	4.6	4.7	4.6	4.6					

	Rhinolophus euryotis timidus A.M.N.H. 101940 ♂ W. New Guinea	*Rhinolophus euryotis timidus* A.M.N.H. 101941 ♀ W. New Guinea	*Rhinolophus euryotis timidus* A.M.N.H. 101942 ♀ W. New Guinea	*Rhinolophus euryotis* A.M.N.H. 102249 ♀ Wawo, S.E. Celebes	*Rhinolophus euryotis* A.M.N.H. 102236 Maros, Talassa, S. Celebes	*Rhinolophus euryotis* A.M.N.H. 102237 ♀ Maros, Talassa, S. Celebes	*Rhinolophus euryotis* A.M.N.H. 102238 ♀ Maros, Talassa, S. Celebes	*Rhinolophus euryotis* Buitensorg Mus. 2642 Latimodjong Mts., Celebes	*Rhinolophus euryotis* Buitensorg Mus. 2643 Latimodjong Mts., Celebes
Skin:									
forearm	56.0	54.0	55.0	51.0	48.0	49.0	49.0	50.0	49.0
Skull:									
zygomatic breadth									
breadth braincase	10.0	9.7	10.0	9.4	9.0	9.1	8.9	9.4	
mastoid breadth									
width rostral swelling	7.1	6.5	6.4	5.8	5.8	5.9	5.9	6.1	
length palatal arch	2.8	2.5	2.6	2.4	2.2	2.0	2.1	2.4	
breadth meso.-pter. fossa	3.8	3.8	3.7	3.3	3.5	3.5	3.4	3.4	
width across m^3-m^3	9.4	8.9	9.2	8.0	8.0	8.3	8.4	8.5	
Teeth:									
crowns c-m^3	10.0	9.2	9.6	8.9	8.6	8.7	8.5	9.3	
crowns m^{1-3}	5.8	5.5	5.7	5.3	5.1	5.1	5.1	5.4	